Mink3a protein sequence

1 MGDPAPARSLDDIDLSALRDPAGIFELVEVVGNGTYGQVYKGRHVKTGQLAAIKVMDVTE
61 DEEEEIKQEINMLKKYSHHRNIATYYGAFIKKSPPGNDDQLWLVMEFCGAGSVTDLVKNT
121 KGNALKEDCIAYICREILRGLAHLHAHKVIHRDIKGQNVLLTENAEVKLVDFGVSAQLDR
181 TVGRRNTFIGTPYWMAPEVIACDENPDATYDYRSDIWSLGITAIEMAEGAPPLCDMHPMR
241 ALFLIPRNPPPRLKSKKWSKKFIDFIDTCLIKTYLSRPPTEQLLKFPFIRDQPTERQVRI
301 QLKDHIDRSRKKRGEKEETEYEYSGSEEEDDSHGEEGEPSSIMNVPGESTLRREFLRLQQ
361 ENKSNSEALKQQQQLQQQQQRDPEAHIKHLLHQRQRRIEEQKEERRRVEEQQRREREQRK
421 LQEKEQQRRLEDMQALRREEERRQAEREQEYKRKQLEEQRQSERLQRQLQQEHAYLKSLQ
481 QQQQQQQLQKQQQQQLLPGDRKPLYHYGRGMNPADKPAWAREVEERTRMNKQQNSPLAKS
541 KPGSTGPEPPIPQASPGPPGPLSQTPPMQRPVEPQEGPHKSLQDQPTRNLAAFPASHDPD
601 PAIPAPTATPSARGAVIRQNSDPTSEGPGPSPNPPAWVRPDNEAPPKVPQRTSSIATALN
661 TSGAGGSRPAQAVRARPRSNSAWQIYLQRRAERGTPKPPGPPAQPPGPPNASSNPDLRRS
721 DPGWERSDSVLPASHGHLPQAGSLERNRVGASSKLDSSPVLSPGNKAKPDDHRSRPGRPA
781 DFVLLKERTLDEAPRPPKKAMDYSSSSEEVESSEDDEEEGEGGPAEGSRDTPGGRSDGDT
841 DSVSTMVVHDVEEITGTQPPYGGGTMVVQRTPEEERNLLHADSNGYTNLPDVVQPSHSPT
901 ENSKGQSPPSKDGSGDYQSRGLVKAPGKSSFTMFVDLGIYQPGGSGDSIPITALVGGEGT
961 RLDQLQYDVRKGSVVNVNPTNTRAHSETPEIRKYKKRFNSEILCAALWGVNLLVGTENGL
1021 MLLDRSGQGKVYGLIGRRRFQQMDVLEGLNLLITISGKRNKLRVYYLSWLRNKILHNDPE
1081 VEKKQGWTTVGDMEGCGHYRVVKYERIKFLVIALKSSVEVYAWAPKPYHKFMAFKSFADL
1141 PHRPLLVDLTVEEGQRLKVIYGSSAGFHAVDVDSGNSYDIYIPVHIQSQITPHAIIFLPN
1201 TDGMEMLLCYEDEGVYVNTYGRIIKDVVLQWGEMPTSVAYICSNQIMGWGEKAIEIRSVE
1261 TGHLDGVFMHKRAQRLKFLCERNDKVFFASVRSGGSSQVYFMTLNRNCIMNW

Mink3a nucleotide sequence

GCCCTT**ATG**GGCGACCCAGCCCCCGCCCGC
AGCCTGGACGACATCGACCTGTCCGCCCTGCGGGACCCTGCTGGGATCTTTGAGCTTGTG
GAGGTGGTCGGCAATGGAACCTACGGACAGGTGTACAAGGGTCGGCATGTCAAGACGGGG
CAGCTGGCTGCCATCAAGGTCATGGATGTCACGGAGGACGAGGAGGAAGAGATCAAACAG
GAGATCAACATGCTGAAAAAGTACTCTCACCACCGCAACATCGCCACCTACTACGGAGCC
TTCATCAAGAAGAGCCCCCCGGGAAACGATGACCAGCTCTGGCTGGTGATGGAGTTCTGT
GGTGCTGGTTCAGTGACTGACCTGGTAAAGAACACAAAAGGCAACGCCCTGAAGGAGGAC
TGTATCGCCTATATCTGCAGGGAGATCCTCAGGGGTCTGGCCCATCTCCATGCCCACAAG
GTGATCCATCGAGACATCAAGGGGCAGAATGTGCTGCTGACAGAGAATGCTGAGGTCAAG
CTAGTGGATTTTGGGGTGAGTGCTCAGCTGGACCGCACCGTGGGCAGACGGAACACTTTC
ATTGGGACTCCCTACTGGATGGCTCCAGAGGTCATCGCCTGTGATGAGAACCCTGATGCC
ACCTATGATTACAGGAGTGATATTTGGTCTCTAGGAATCACAGCCATCGAGATGGCAGAG
GGAGCCCCCCCTCTGTGTGACATGCACCCCATGCGAGCCCTCTTCCTCATTCCTCGGAAC
CCTCCGCCCAGGCTCAAGTCCAAGAAGTGGTCTAAGAAGTTCATTGACTTCATTGACACA
TGTCTCATCAAGACTTACCTGAGCCGCCCACCCACGGAGCAGCTACTGAAGTTTCCCTTC
ATCCGGGACCAGCCCACGGAGCGGCAGGTCCGCATCCAGCTTAAGGACCACATTGACCGA
TCCCGGAAGAAGCGGGGTGAGAAAGAGGAGACAGAATATGAGTACAGCGGCAGCGAGGAG
GAAGATGACAGCCATGGAGAGGAAGGAGAGCCAAGCTCCATCATGAACGTGCCTGGAGAG
TCGACTCTACGCCGGGAGTTTCTCCGGCTCCAGCAGGAAAATAAGAGCAACTCAGAGGCT
TTAAAACAGCAGCAGCAGCTGCAGCAGCAGCAGCAGCGAGACCCCGAGGCACACATCAAA
CACCTGCTGCACCAGCGGCAGCGGCGCATAGAGGAGCAGAAGGAGGAGCGGCGCCGCGTG
GAGGAGCAACAGCGGCGGGAGCGGGAGCAGCGGAAGCTGCAGGAGAAGGAGCAGCAGCGG
CGGCTGGAGGACATGCAGGCTCTGCGGCGGGAGGAGGAGCGGCGGCAGGCGGAGCGTGAG
CAGGAATACAAGCGGAAGCAGCTGGAGGAGCAGCGGCAGTCAGAAGCTGTGGCAGAGCGAG

CTGCAGCAGGAGCATGCCTACCTCAAGTCCCTGCAGCAGCAGCAACAGCAGCAGCAGCTT
CAGAAACAGCAGCAGCAGCAGCTCCTGCCTGGGGACAGGAAGCCCCTGTACCATTATGGT
CGGGGCATGAATCCCGCTGACAAACCAGCCTGGGCCCGAGAGGTAGAAGAGAGAACAAGG
ATGAACAAGCAGCAGAACTCTCCCTTGGCCAAGAGCAAGCCAGGCAGCACGGGGCCTGAG
CCCCCCATCCCCCAGGCCTCCCCAGGGCCCCCAGGACCCCTTTCCCAGACTCCTCCTATG
CAGAGGCCGGTGGAGCCCCAGGAGGGACCGCACAAGTCCCTGCAGGACCAGCCCACCCGA
AACCTGGCTGCCTTCCCAGCCTCCCATGACCCCGACCCTGCCATCCCCGCACCCACTGCC
ACGCCCAGTGCCCGAGGAGCTGTCATCCGCCAGAATTCAGACCCCACCTCTGAAGGACCT
GGCCCCAGCCCGAATCCCCCAGCCTGGGTCCGCCCAGATAACGAGGCCCCACCCAAGGTG
CCTCAGAGGACCTCATCTATCGCCACTGCCCTTAACACCAGTGGGGCCGGAGGGTCCCGG
CCAGCCCAGGCAGTCCGTGCCAGACCTCGCAGCAACTCCGCCTGGCAAATCTATCTGCAA
AGGCGGGCAGAGCGGGGCACCCCAAAGCCTCCAGGGCCCCCTGCTCAGCCCCCTGGCCCG
CCCAACGCCTCTAGTAACCCCGACCTCAGGAGGAGCGACCCTGGCTGGGAACGCTCGGAC
AGCGTCCTTCCAGCCTCTCACGGGCACCTCCCCCAGGCTGGCTCACTGGAGCGGAACCGC
GTGGGAGCCTCCTCCAAACTGGACAGCTCCCCTGTGCTCTCCCCTGGGAATAAAGCCAAG
CCCGACGACCACCGCTCACGGCCAGGCCGGCCCGCAGACTTTGTGTTGCTGAAAGAGCGG
ACTCTGGACGAGGCCCCTCGGCCTCCCAAGAAGGCCATGGACTACTCGTCGTCCAGCGAG
GAGGTGGAAAGCAGTGAGGACGACGAGGAGGAAGGCGAAGGCGGGCCAGCAGAGGGGAGC
AGAGATACCCCTGGGGGCCGCAGCGATGGGGATACAGACAGCGTCAGCACCATGGTGGTC
CACGACGTCGAGGAGATCACCGGGACCCAGCCCCCATACGGGGGCGGCACCATGGTGGTC
CAGCGCACCCCTGAAGAGGAGCGGAACCTGCTGCATGCTGACAGCAATGGGTACACAAAC
CTGCCTGACGTGGTCCAGCCCAGCCACTCACCCACCGAGAACAGCAAAGGCCAAAGCCCA
CCCTCGAAGGATGGGAGTGGTGACTACCAGTCTCGTGGGCTGGTAAAGGCCCCTGGCAAG
AGCTCGTTCACGATGTTTGTGGATCTAGGGATCTACCAGCCTGGAGGCAGTGGGGACAGC
ATCCCCATCACAGCCCTAGTGGGTGGAGAGGGCACTCGGCTCGACCAGCTGCAGTACGAC
GTGAGGAAGGGTTCTGTGGTCAACGTGAATCCCACCAACACCCGGGCCCACAGTGAGACC
CCTGAGATCCGGAAGTACAAGAAGCGATTCAACTCCGAGATCCTCTGTGCAGCCCTTTGG
GGGGTCAACCTGCTGGTGGGCACGGAGAACGGGCTGATGTTGCTGGACCGAAGTGGGCAG
GGCAAGGTGTATGGACTCATTGGGCGGCGACGCTTCCAGCAGATGGATGTGCTGGAGGGG
CTCAACCTGCTCATCACCATCTCAGGGAAAAGGAACAAACTGCGGGTGTATTACCTGTCC
TGGCTCCGGAACAAGATTCTGCACAATGACCCAGAAGTGGAGAAGAAGCAGGGCTGGACC
ACCGTGGGGGACATGGAGGGCTGCGGGCACTACCGTGTTGTGAAATACGAGCGGATTAAG
TTCCTGGTCATCGCCCTCAAGAGCTCCGTGGAGGTGTATGCCTGGGCCCCCAAACCCTAC
CACAAATTCATGGCCTTCAAGTCCTTTGCCGACCTCCCCCACCGCCCTCTGCTGGTCGAC
CTGACAGTAGAGGAGGGGCAGCGGCTCAAGGTCATCTATGGCTCCAGTGCTGGCTTCCAT
GCTGTGGATGTCGACTCGGGGAACAGCTATGACATCTACATCCCTGTGCACATCCAGAGC
CAGATCACGCCCCATGCCATCATCTTCCTCCCCAACACCGACGGCATGGAGATGCTGCTG
TGCTACGAGGACGAGGGTGTCTACGTCAACACGTACGGGCGCATCATTAAGGATGTGGTG
CTGCAGTGGGGGGAGATGCCTACTTCTGTGGCCTACATCTGCTCCAACCAGATAATGGGC
TGGGGTGAGAAAGCCATTGAGATCCGCTCTGTGGAGACGGGCCACCTCGACGGGGTCTTC
ATGCACAAACGAGCTCAGAGGCTCAAGTTCCTGTGTGAGCGGAATGACAAGGTGTTTTTT
GCCTCAGTCCGCTCTGGGGGCAGCAGCCAAGTTTACTTCATGACTCTGAACCGTAACTGC
ATCATGAACTGG**TGA**AAGGGC

FIG. 1

Sheet 2

Mink3b protein sequence

```
1   MDVTEDEEEEIKQEINMLKKYSHHRNIATYYGAFIKKSPPGNDDQLWLVMEFCGAGSVTD
61  LVKNTKGNALKEDCIAYICREILRGLAHLHAHKVIHRDIKGQNVLLTENAEVKLVDFGVS
121 AQLDRTVGRRNTFIGTPYWMAPEVIACDENPDATYDYRSDIWSLGITAIEMAEGAPPLCD
181 MHPMRALFLIPRNPPPRLKSKKWSKKFIDFIDTCLIKTYLSRPPTEQLLKFPFIRDQPTE
241 RQVRIQLKDHIDRSRKKRGEKEETEYEYSGSEEEDDSHGEEGEPSSIMNVPGESTLRREF
301 LRLQQENKSNSEALKQQQQLQQQQQRDPEAHIKHLLHQRQRRIEEQKEERRRVEEQQRRE
361 REQRKLQEKEQQRRLEDMQALRREEERRQAEREQEYKRKQLEEQRQSERLQRQLQQEHAY
421 LKSLQQQQQQQQLQKQQQQQLLPGDRKPLYHYGRGMNPADKPAWAREVEERTRMNKQQNS
481 PLAKSKPGSTGPEPPIPQASPGPPGPLSQTPPMQRPVEPQEGPHKSLVAHRVPLKPYAAP
541 VPRSQSLQDQPTRNLAAFPASHDPDPAIPAPTATPSARGAVIRQNSDPTSEGPGPSPNPP
601 AWVRPDNEAPPKVPQRTSSIATALNTSGAGGSRPAQAVRARPRSNSAWQIYLQRRAERGT
661 PKPPGPPAQPPGPPNASSNPDLRRSDPGWERSDSVLPASHGHLPQAGSLERNRVGASSKL
721 DSSPVLSPGNKAKPDDHRSRPGRPAVSHLVAGMACLILVWGLASGCWVSGVGSPLIYREG
781 LWGWRDWCFSWC
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Mink3b nucleotide sequence

```
GCCCTT
ACCATTCTGGAAGCTCCCTAGAATCTCCTGGAATGCTTAATGGACCTTTCCAGCACCGAA
ATTCAAGAATTATGACTCATCGGTCAGCAGAAAAGACCCTGCTGGGATCTTTGAGCTTGT
GGAGGTGGTCGGCAATGGAACCTACGGACAGGTGTACAAGGGTCGGCATGTCAAGACGGG
GCAGCTGGCTGCCATCAAGGTCATGGATGTCACGGAGGACGAGGAGGAAGAGATCAAACA
GGAGATCAACATGCTGAAAAAGTACTCTCACCACCGCAACATCGCCACCTACTACGGAGC
CTTCATCAAGAAGAGCCCCCCGGGAAACGATGACCAGCTCTGGCTGGTGATGGAGTTCTG
TGGTGCTGGTTCAGTGACTGACCTGGTAAAGAACACAAAAGGCAACGCCCTGAAGGAGGA
CTGTATCGCCTATATCTGCAGGGAGATCCTCAGGGGTCTGGCCCATCTCCATGCCCACAA
GGTGATCCATCGAGACATCAAGGGGCAGAATGTGCTGCTGACAGAGAATGCTGAGGTCAA
GCTAGTGGATTTTGGGGTGAGTGCTCAGCTGGACCGCACCGTGGGCAGACGGAACACTTT
CATTGGGACTCCCTACTGGATGGCTCCAGAGGTCATCGCCTGTGATGAGAACCCTGATGC
CACCTATGATTACAGGAGTGATATTTGGTCTCTAGGAATCACAGCCATCGAGATGGCAGA
GGGAGCCCCCCCTCTGTGTGACATGCACCCCATGCGAGCCCTCTTCCTCATTCCTCGGAA
CCCTCCGCCCAGGCTCAAGTCCAAGAAGTGGTCTAAGAAGTTCATTGACTTCATTGACAC
ATGTCTCATCAAGACTTACCTGAGCCGCCCACCCACGGAGCAGCTACTGAAGTTTCCCTT
CATCCGGGACCAGCCCACGGAGCGGCAGGTCCGCATCCAGCTTAAGGACCACATTGACCG
ATCCCGGAAGAAGCGGGGTGAGAAAGAGGAGACAGAATATGAGTACAGCGGCAGCGAGGA
GGAAGATGACAGCCATGGAGAGGAAGGAGAGCCAAGCTCCATCATGAACGTGCCTGGAGA
GTCGACTCTACGCCGGGAGTTTCTCCGGCTCCAGCAGGAAAATAAGAGCAACTCAGAGGC
TTTAAAACAGCAGCAGCAGCTGCAGCAGCAGCAGCAGCGAGACCCCGAGGCACACATCAA
ACACCTGCTGCACCAGCGGCAGCGGCGCATAGAGGAGCAGAAGGAGGAGCGGCGCCGCGT
GGAGGAGCAACAGCGGCGGGAGCGGGAGCAGCGGAAGCTGCAGGAGAAGGAGCAGCAGCG
GCGGCTGGAGGACATGCAGGCTCTGCGGCGGGAGGAGGAGCGGCGGCAGGCGGAGCGTGA
GCAGGAATACAAGCGGAAGCAGCTGGAGGAGCAGCGGCAGTCAGAACGTCTCCAGAGGCA
GCTGCAGCAGGAGCATGCCTACCTCAAGTCCCTGCAGCAGCAGCAACAGCAGCAGCAGCT
TCAGAAACAGCAGCAGCAGCAGCTCCTGCCTGGGGACAGGAAGCCCCTGTACCATTATGG
TCGGGGCATGAATCCCGCTGACAAACCAGCCTGGGCCCGAGAGGTAGAAGAGAGAACAAG
GATGAACAAGCAGCAGAACTCTCCCTTGGCCAAGAGCAAGCCAGGCAGCACGGGGCCTGA
GCCCCCCATCCCCCAGGCCTCCCCAGGGCCCCCAGGACCCCTTTCCCAGACTCCTCCTAT
GCAGAGGCCGGTGGAGCCCCAGGAGGGACCGCACAAGAGCCTGGTGGCACACCGGGTCCC
```

FIG. 1

ACTGAAGCCATATGCAGCACCTGTACCCCGATCCCAGTCCCTGCAGGACCAGCCCACCCG
AAACCTGGCTGCCTTCCCAGCCTCCCATGACCCCGACCCTGCCATCCCCGCACCCACTGC
CACGCCCAGTGCCCGAGGAGCTGTCATCCGCCAGAATTCAGACCCCACCTCTGAAGGACC
TGGCCCCAGCCCGAATCCCCCAGCCTGGGTCCGCCCAGATAACGAGGCCCCACCCAAGGT
GCCTCAGAGGACCTCATCTATCGCCACTGCCCTTAACACCAGTGGGGCCGGAGGGTCCCG
GCCAGCCCAGGCAGTCCGTGCCAGACCTCGCAGCAACTCCGCCTGGCAAATCTATCTGCA
AAGGCGGGCAGAGCGGGGCACCCCAAAGCCTCCAGGGCCCCCTGCTCAGCCCCCTGGCCC
GCCCAACGCCTCTAGTAACCCCGACCTCAGGAGGAGCGACCCTGGCTGGGAACGCTCGGA
CAGCGTCCTTCCAGCCTCTCACGGGCACCTCCCCCAGGCTGGCTCACTGGAGCGGAACCG
CGTGGGAGCCTCCTCCAAACTGGACAGCTCCCCTGTGCTCTCCCCTGGGAATAAAGCCAA
GCCCGACGACCACCGCTCACGGCCAGGCCGGCCCGCAGTGAGTCACCTGGTGGCAGGCAT
GGCCTGCCTCATCCTGGTTTGGGGCTTAGCCTCAGGGTGCTGGGTGTCAGGGGTGGGGTC
TCCGCTGATCTACCGAGAAGGGCTGTGGGGATGGAGGGACTGGTGCTTCTCATGGTGC**TA**
ACCTTTCCTAACCTCTCTCCTAACCTCTCTCCTAACCTCTCTTCTGGCTCTTTCTTCCCC
TGCGGCCCCTCCCAGAGCTATAAGCGAGCAATTGGTGAGGTTAGTGAGATGGGCCTGCTT
GTGGGAGCCCCTCCTGTCGCCCTGCTGGGGCGTCCCGGCACCCTTTGTCTACCTCCACCC
AGGCCCAGCTTCTCCCTGCCCCTCACGTGGCTCCTCCCTGCAGGACTTTGTGTTGCTGAA
AGAGCGGACTCTGGACGAGGCCCCTCGGCCTCCCAAGAAGGCCATGGACTACTCGTCGTC
CAGCGAGGAGGTGGAAAGCAGTGAGGACGACGAGGAGGAAGGCGAAGGCGGGCCAGCAGA
GGGGAGCAGAGATACCCCTGGGGGCCGCAGCGATGGGGATACAGACAGCGTCAGCACCAT
GGTGGTCCACGACGTCGAGGAGATCACCGGGACCCAGCCCCCATACGGGGGCGGCACCAT
GGTGGTCCAGCGCACCCCTGAAGAGGAGCGGAACCCGCTGCATGCTGACAGCAATGGGTA
CACAAACCTGCCTGACGTGGTCCAGCCCAGCCACTCACCCACCGAGAACAGCAAAGGCCA
AAGCCCACCCTCGAAGGATGGGAGTGGTGACTACCAGTCTCGTGGGCTGGTAAAGGCCCC
TGGCAAGAGCTCGTTCACGATGTTTGTGGATCTAGGGATCTACCAGCCTGGAGGCAGTGG
GGACAGCATCCCCATCACAGCCCTAGTGGGTGGAGAGGGCACTCGGCTCGACCAGCTGCA
GTACGACGTGAGGAAGGGTTCTGTGGTCAACGTGAATCCCACCAACACCCGGGCCCACAG
TGAGACCCCTGAGATCCGGAAGTACAAGAAGCGATTCAACTCCGAGATCCTCTGTGCAGC
CCTTTGGGGGGTCAACCTGCTGGTGGGCACGGAGAACGGGCTGATGTTGCTGGACCGAAG
TGGGCAGGACAAGGTGTATGGACTCATTGGGCGACGACGCTTCCAGCAGATGGATGTGCT
GGAGGGGCTCAACCTGCTCATCACCATCTCAGGGAAAAGGAACAAACTGCGGGTGTATTA
CCTGTCCTGGCTCCGGAACAAGATTCTGCACAATGACCCAGAAGTGGAGAAGAAGCAGGG
CTGGACCACCGTGGGGGACATGGAGGGCTGCGGGCACTACCGTGTTGTGAAATACGAGCG
GATTAAGTTCCTGGTCATCGCCCTCAAGAGCTCCGTGGAGGTGTATGCCTGGGCCCCCAA
ACCCTACCACAAATTCATGGCCTTCAAGTCCTTTGCCGACCTCCCCCACCGCCCTCTGCT
GGTCGACCTGACAGTAGAGGAGGGGCAGCGGCTCAAGGTCATCTATGGCTCCAGTGCTGG
CTTCCATGCTGTGGATGTCGACTCGGGGAACAGCTATGACATCTACATCCCTGTGCACAT
CCAGAGCCAGATCACGCCCCATGCCATCATCTTCCTCCCCAACACCGACGGCATGGAGAT
GCTGCTGTGCTACGAGGACGAGGGTGTCTACGTCAACACGTACGGGCGCATCATTAAGGA
TGTGGTGCTGCAGTGGGGGGGAGATGCCTACTTCTGTGGCCTACATCTGCTCCAACCAGAT
AATGGGCTGGGGTGAGAAAGCCATTGAGATCCGCTCTGTGGAGACGGGCCACCTCGACGG
GGTCTTCATGCACAAACGAGCTCAGAGGCTCAAGTTCCTGTGTGAGCGGAATGACAAGGT
GTTTTTTGCCTCAGTCCGCTCTGGGGGCAGCAGCCAAGTTTACTTCATGACTCTGAACCG
TAACTGCATCATGAACTGG**TGA**AAGGGC

FIG. 1
Sheet 4

Mink3c protein sequence

```
1    MDVTEDEEEEIKQEINMLKKYSHHRNIATYYGAFIKKSPPGNDDQLWLVMEFCGAGSVTD
61   LVKNTKGNALKEDCIAYICREILRGLAHLHAHKVIHRDIKGQNVLLTENAEVKLVDFGVS
121  AQLDRTVGRRNTFIGTPYWMAPEVIACDENPDATYDYRSDIWSLGITAIEMAEGAPPLCD
181  MHPMRALFLIPRNPPPRLKSKKWSKKFIDFIDTCLIKTYLSRPPTEQLLKFPFIRDQPTE
241  RQVRIQLKDHIDRSRKKRGEKEETEYEYSGSEEEDDSHGEEGEPSSIMNVPGESTLRREF
301  LRLQQENKSNSEALKQQQQLQQQQQRDPEAHIKHLLHQRQRRIEEQKEERRRVEEQQRRG
361  REQRKLQEKEQQRRLEDMQALRREEERRQAEREQEYKRKQLEEQRQSERLQRQLQQEHAY
421  LKSLQQQQQQQQLQKQQQQQLLPGDRKPLYHYGRGMNPADKPAWAREVEERTRMNKQQNS
481  PLAKSKPGSTGPEPPIPQASPGPPGPLSQTPPMQRPVEPQEGPHKSLVAHRVPLKPYAAP
541  VPRSQSLQDQPTRNLAAFPASHDPDPAIPAPTATPSARGAVIRQNSDPTSEGPGPSPNPP
601  AWVRPDNEAPPKVPQRTSSIATALNTSGAGGSRPAQAVRARPRSNSAWQIYLQRRAERGT
661  PKPPGPPAQPPGPPNASSNPDLRRSDPGWERSDSVLPASHGHLPQAGSLERNRVGASSKL
721  DSSPVLSPGNKAKPDDHRSRPGRPADFVLLKERTLDEAPRPPKKAMDYSSSSEEVESSED
781  DEEEGEGGPAEGSRDTPGGRDGDTDSVSTMVVHDVEEITGTQPPYGGGTMVVQRTPEEER
841  NLLHADSNGYTNLPDVVQPSHSPTENSKGQSPPSKDGSGDYQSRGLVKAPGKSSFTMFVD
901  LGIYQPGGSGDSIPITALVGGEGTRLDQLQYDVRKGSVVNVNPTNTRAHSETPEIRKYKK
961  RFNSEILCAALWGVNLLVGTENGLMLLDRSGQGKVYGLIGRRRFQQMDVLEGLNLLITIS
1021 GKRNKLRVYYLSWLRNKILHNDPEVEKKQGWTTVGDMEGCGHYRVVKYERIKFLVIALKS
1081 SVEVYAWAPKPYHKFMAFKSFADLPHRPLLVDLTVEEGQRLKVIYGSSAGFHAADVDSGN
1141 SYDIYIPVHIQSQITPHAIIFLPNTDGMEMLLCYEDEGVYVNTYGRIIKDVVLQWGEMPT
1201 SVAYICSNQIMGWGEKAIEIRSVETGHLDGVFMHKRAQRLKFLCERNDKVFFASVRSGGS
1261 SQVYFMTLNRNCIMNW
```

Mink3c nucleotide sequence

```
ACCATTCTGGAAGCTCCCTAGAATCTCCTGGAATGCT
TAATGGACCTTTCCAGCACCGAAATTCAAGAATTATGACTCATCGGTCAGCAGAAAAGAC
CCTGCTGGGATCTTTGAGCTTGTGGAGGTGGTCGGCAATGGAACCTACGGACAGGTGTAC
AAGGGTCGGCATGTCAAGACGGGGCAGCTGGCTGCCATCAAGGTC**ATG**GATGTCACGGAG
GACGAGGAGGAAGAGATCAAACAGGAGATCAACATGCTGAAAAAGTACTCTCACCACCGC
AACATCGCCACCTACTACGGAGCCTTCATCAAGAAGAGCCCCCCGGGAAACGATGACCAG
CTCTGGCTGGTGATGGAGTTCTGTGGTGCTGGTTCAGTGACTGACCTGGTAAAGAACACA
AAAGGCAACGCCCTGAAGGAGGACTGTATCGCCTATATCTGCAGGGAGATCCTCAGGGGT
CTGGCCCATCTCCATGCCCACAAGGTGATCCATCGAGACATCAAGGGGCAGAATGTGCTG
CTGACAGAGAATGCTGAGGTCAAGCTAGTGGATTTTGGGGTGAGTGCTCAGCTGGACCGC
ACCGTGGGCAGACGGAACACTTTCATTGGGACTCCCTACTGGATGGCTCCAGAGGTCATC
GCCTGTGATGAGAACCCTGATGCCACCTATGATTACAGGAGTGATATTTGGTCTCTAGGA
ATCACAGCCATCGAGATGGCAGAGGGAGCCCCCCCTCTGTGTGACATGCACCCCATGCGA
GCCCTCTTCCTCATTCCTCGGAACCCTCCGCCCAGGCTCAAGTCCAAGAAGTGGTCTAAG
AAGTTCATTGACTTCATTGACACATGTCTCATCAAGACTTACCTGAGCCGCCCACCCACG
GAGCAGCTACTGAAGTTTCCCTTCATCCGGGACCAGCCCACGGAGCGGCAGGTCCGCATC
CAGCTTAAGGACCACATTGACCGATCCCGGAAGAAGCGGGGTGAGAAAGAGGAGACAGAA
TATGAGTACAGCGGCAGCGAGGAGGAAGATGACAGCCATGGAGAGGAAGGAGAGCCAAGC
TCCATCATGAACGTGCCTGGAGAGTCGACTCTACGCCGGGAGTTTCTCCGGCTCCAGCAG
GAAAATAAGAGCAACTCAGAGGCTTTAAAACAGCAGCAGCAGCTGCAGCAGCAGCAGCAG
CGAGACCCCGAGGCACACATCAAACACCTGCTGCACCAGCGGCAGCGGCGCATAGAGGAG
CAGAAGGAGGAGCGGCGCCGCGTGGAGGAGCAACAGCGGCGGGGGCGGGAGCAGCGGAAG
CTGCAGGAGAAGGAGCAGCAGCGGCGGCTGGAGGACATGCAGGCTCTGCGGCGGGAGGAG
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FIG. 1

GAGCGGCGGCAGGCGGAGCGTGAGCAGGAATACAAGCGGAAGCAGCTGGAGGAGCAGCGG
CAGTCAGAACGTCTCCAGAGGCAGCTGCAGCAGGAGCATGCCTACCTCAAGTCCCTGCAG
CAGCAGCAACAGCAGCAGCAGCTTCAGAAACAGCAGCAGCAGCAGCTCCTGCCTGGGGAC
AGGAAGCCCCTGTACCATTATGGTCGGGGCATGAATCCCGCTGACAAACCAGCCTGGGCC
CGAGAGGTAGAAGAGAGAACAAGGATGAACAAGCAGCAGAACTCTCCCTTGGCCAAGAGC
AAGCCAGGCAGCACGGGGCCTGAGCCCCCCATCCCCCAGGCCTCCCCAGGGCCCCCAGGA
CCCCTTTCCCAGACTCCTCCTATGCAGAGGCCGGTGGAGCCCCAGGAGGGACCGCACAAG
AGCCTGGTGGCACACCGGGTCCCACTGAAGCCATATGCAGCACCTGTACCCCGATCCCAG
TCCCTGCAGGACCAGCCCACCCGAAACCTGGCTGCCTTCCCAGCCTCCCATGACCCCGAC
CCTGCCATCCCCGCACCCACTGCCACGCCCAGTGCCCGAGGAGCTGTCATCCGCCAGAAT
TCAGACCCCACCTCTGAAGGACCTGGCCCCAGCCCGAATCCCCCAGCCTGGGTCCGCCCA
GATAACGAGGCCCCACCCAAGGTGCCTCAGAGGACCTCATCTATCGCCACTGCCCTTAAC
ACCAGTGGGGCCGGAGGGTCCCGGCCAGCCCAGGCAGTCCGTGCCAGACCTCGCAGCAAC
TCCGCCTGGCAAATCTATCTGCAAAGGCGGGCAGAGCGGGGCACCCCAAAGCCTCCAGGG
CCCCCTGCTCAGCCCCCTGGCCCGCCCAACGCCTCTAGTAACCCCGACCTCAGGAGGAGC
GACCCTGGCTGGGAACGCTCGGACAGCGTCCTTCCAGCCTCTCACGGGCACCTCCCCCAG
GCTGGCTCACTGGAGCGGAACCGCGTGGGAGCCTCCTCCAAACTGGACAGCTCCCCTGTG
CTCTCCCCTGGGAATAAAGCCAAGCCCGACGACCACCGCTCACGGCCAGGCCGGCCCGCA
GACTTTGTGTTGCTGAAAGAGCGGACTCTGGACGAGGCCCCTCGGCCTCCCAAGAAGGCC
ATGGACTACTCGTCGTCCAGCGAGGAGGTGGAAAGCAGTGAGGACGACGAGGAGGAAGGC
GAAGGCGGGCCAGCAGAGGGGAGCAGAGATACCCCTGGGGGCCGCGATGGGGATACAGAC
AGCGTCAGCACCATGGTGGTCCACGACGTCGAGGAGATCACCGGGACCCAGCCCCCATAC
GGGGGCGGCACCATGGTGGTCCAGCGCACCCCTGAAGAGGAGCGGAACCTGCTGCATGCT
GACAGCAATGGGTACACAAACCTGCCTGACGTGGTCCAGCCCAGCCACTCACCCACCGAG
AACAGCAAAGGCCAAAGCCCACCCTCGAAGGATGGGAGTGGTGACTACCAGTCTCGTGGG
CTGGTAAAGGCCCCTGGCAAGAGCTCGTTCACGATGTTTGTGGATCTAGGGATCTACCAG
CCTGGAGGCAGTGGGGACAGCATCCCCATCACAGCCCTAGTGGGTGGAGAGGGCACTCGG
CTCGACCAGCTGCAGTACGACGTGAGGAAGGGTTCTGTGGTCAACGTGAATCCCACCAAC
ACCCGGGCCCACAGTGAGACCCCTGAGATCCGGAAGTACAAGAAGCGATTCAACTCCGAG
ATCCTCTGTGCAGCCCTTTGGGGGGTCAACCTGCTGGTGGGCACGGAGAACGGGCTGATG
TTGCTGGACCGAAGTGGGCAGGGCAAGGTGTATGGACTCATTGGGCGGCGACGCTTCCAG
CAGATGGATGTGCTGGAGGGGCTCAACCTGCTCATCACCATCTCAGGGAAAAGGAACAAA
CTGCGGGTGTATTACCTGTCCTGGCTCCGGAACAAGATTCTGCACAATGACCCAGAAGTG
GAGAAGAAGCAGGGCTGGACCACCGTGGGGGACATGGAGGGCTGCGGGCACTACCGTGTT
GTGAAATACGAGCGGATTAAGTTCCTGGTCATCGCCCTCAAGAGCTCCGTGGAGGTGTAT
GCCTGGGCCCCCAAACCCTACCACAAATTCATGGCCTTCAAGTCCTTTGCCGACCTCCCC
CACCGCCCTCTGCTGGTCGACCTGACAGTAGAGGAGGGGCAGCGGCTCAAGGTCATCTAT
GGCTCCAGTGCTGGCTTCCATGCTGCGGATGTCGACTCGGGGAACAGCTATGACATCTAC
ATCCCTGTGCACATCCAGAGCCAGATCACGCCCCATGCCATCATCTTCCTCCCCAACACC
GACGGCATGGAGATGCTGCTGTGCTACGAGGACGAGGGTGTCTACGTCAACACGTACGGG
CGCATCATTAAGGATGTGGTGCTGCAGTGGGGGGAGATGCCTACTTCTGTGGCCTACATC
TGCTCCAACCAGATAATGGGCTGGGGTGAGAAAGCCATTGAGATCCGCTCTGTGGAGACG
GGCCACCTCGACGGGGTCTTCATGCACAAACGAGCTCAGAGGCTCAAGTTCCTGTGTGAG
CGGAATGACAAGGTGTTTTTTGCCTCAGTCCGCTCTGGGGGCAGCAGCCAAGTTTACTTC
ATGACTCTGAACCGTAACTGCATCATGAACTGG**TGA**

FIG. 1

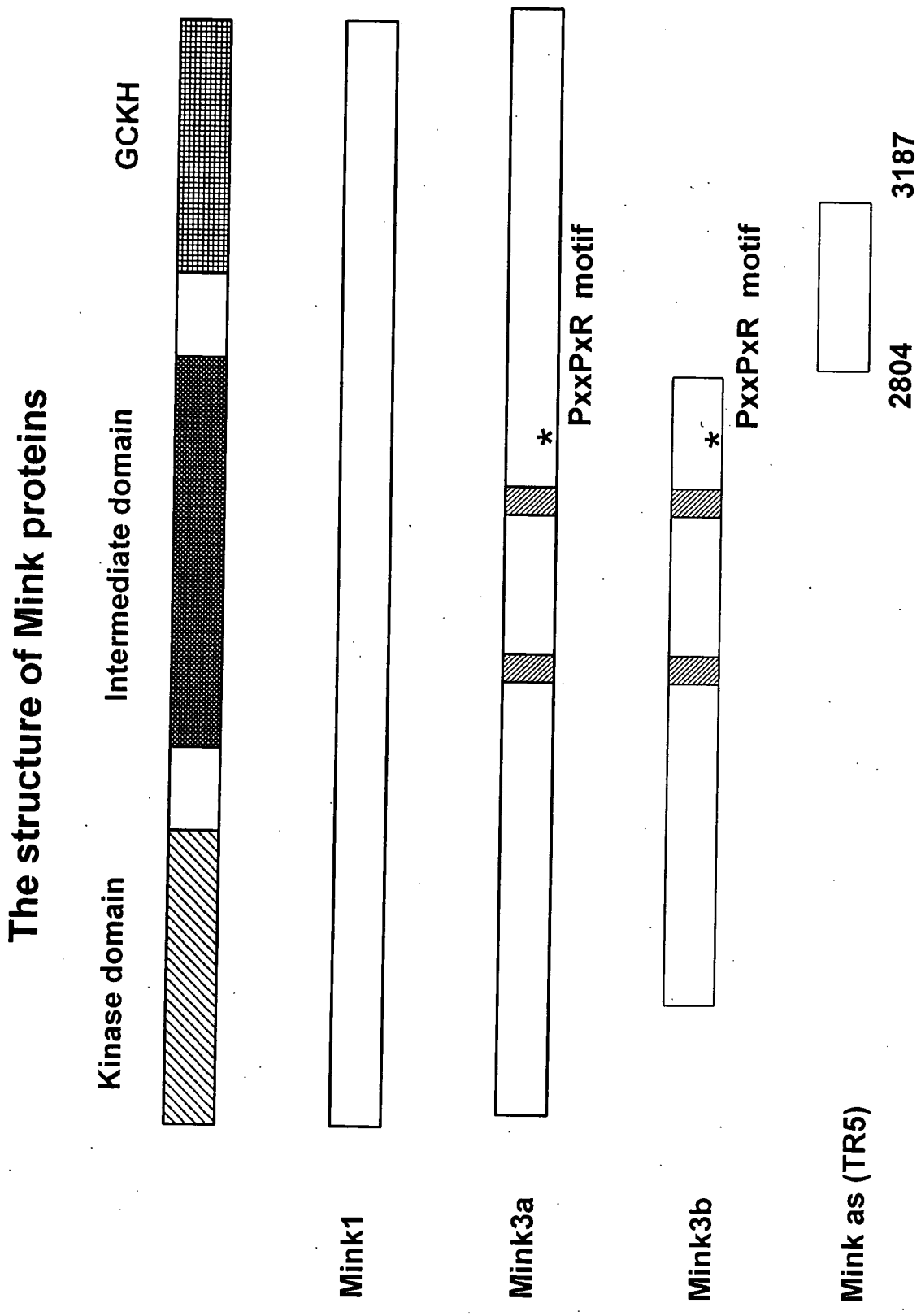

The structure of Mink proteins
Kinase domain
Intermediate domain
GCKH
Mink1
Mink3a
PxxPxR motif
Mink3b
PxxPxR motif
Mink as (TR5)
2804
3187

FIG. 2

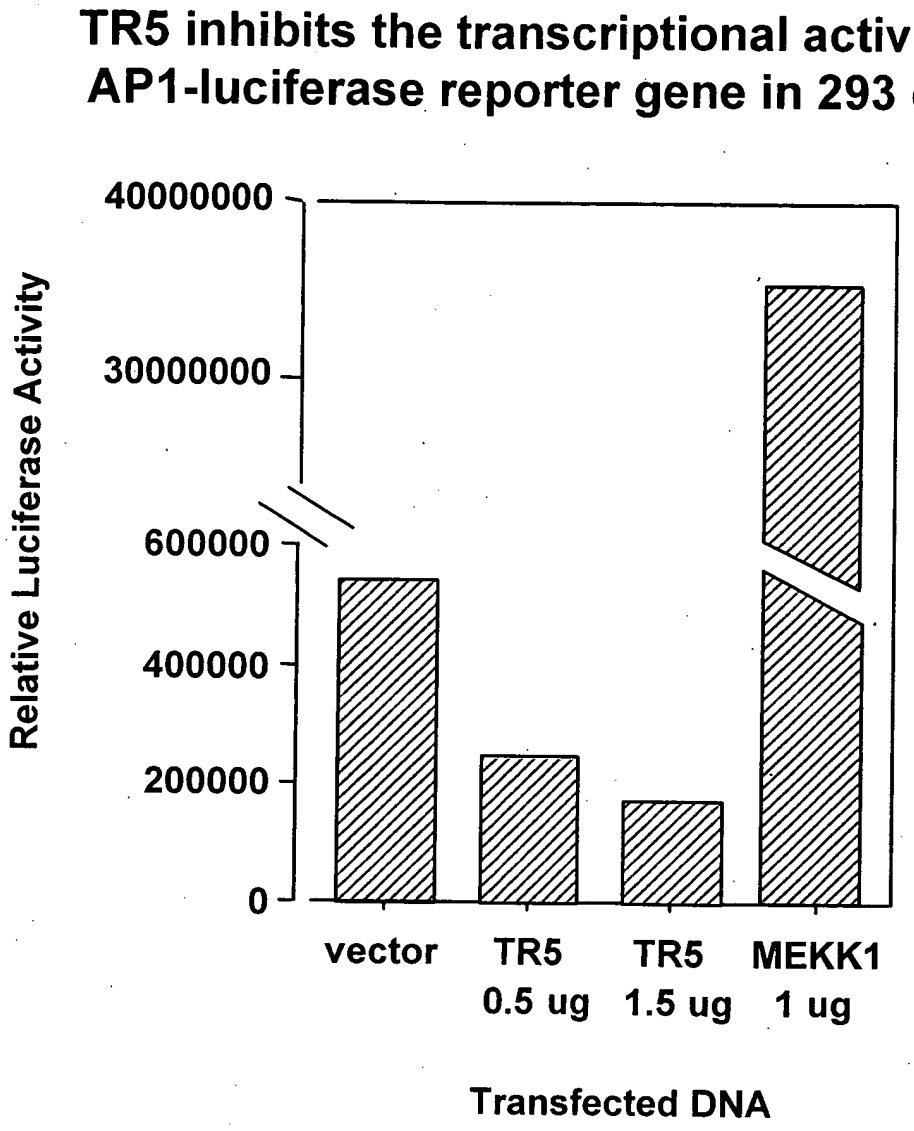

TR5 inhibits the transcriptional activity of AP1-luciferase reporter gene in 293 cells
Relative Luciferase Activity
40000000
30000000
600000
400000
200000
0
vector
TR5 0.5 ug
TR5 1.5 ug
MEKK1 1 ug
Transfected DNA

FIG. 3

Signal pathways regulating Taxol-mediated apoptosis

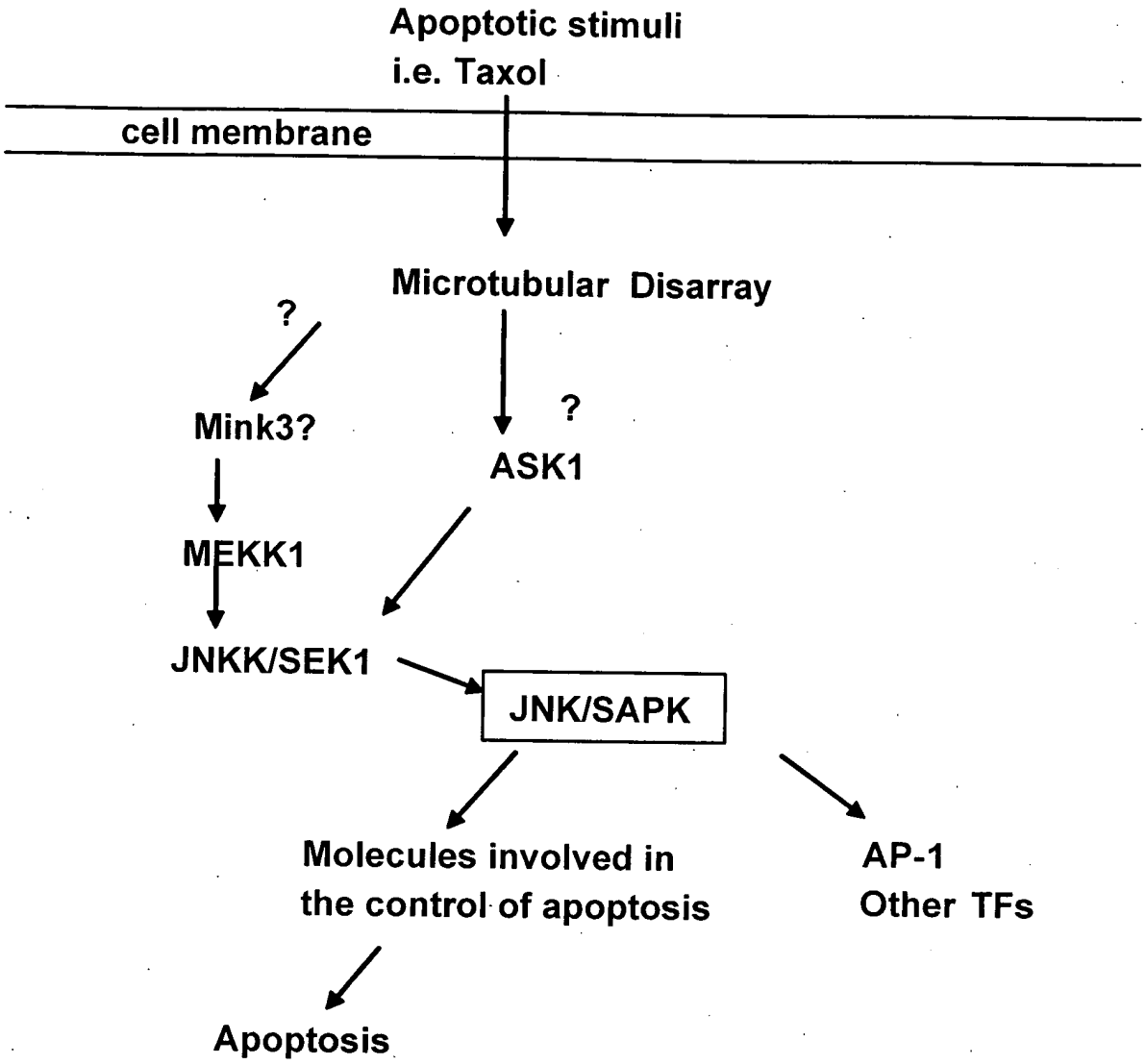


FIG. 4

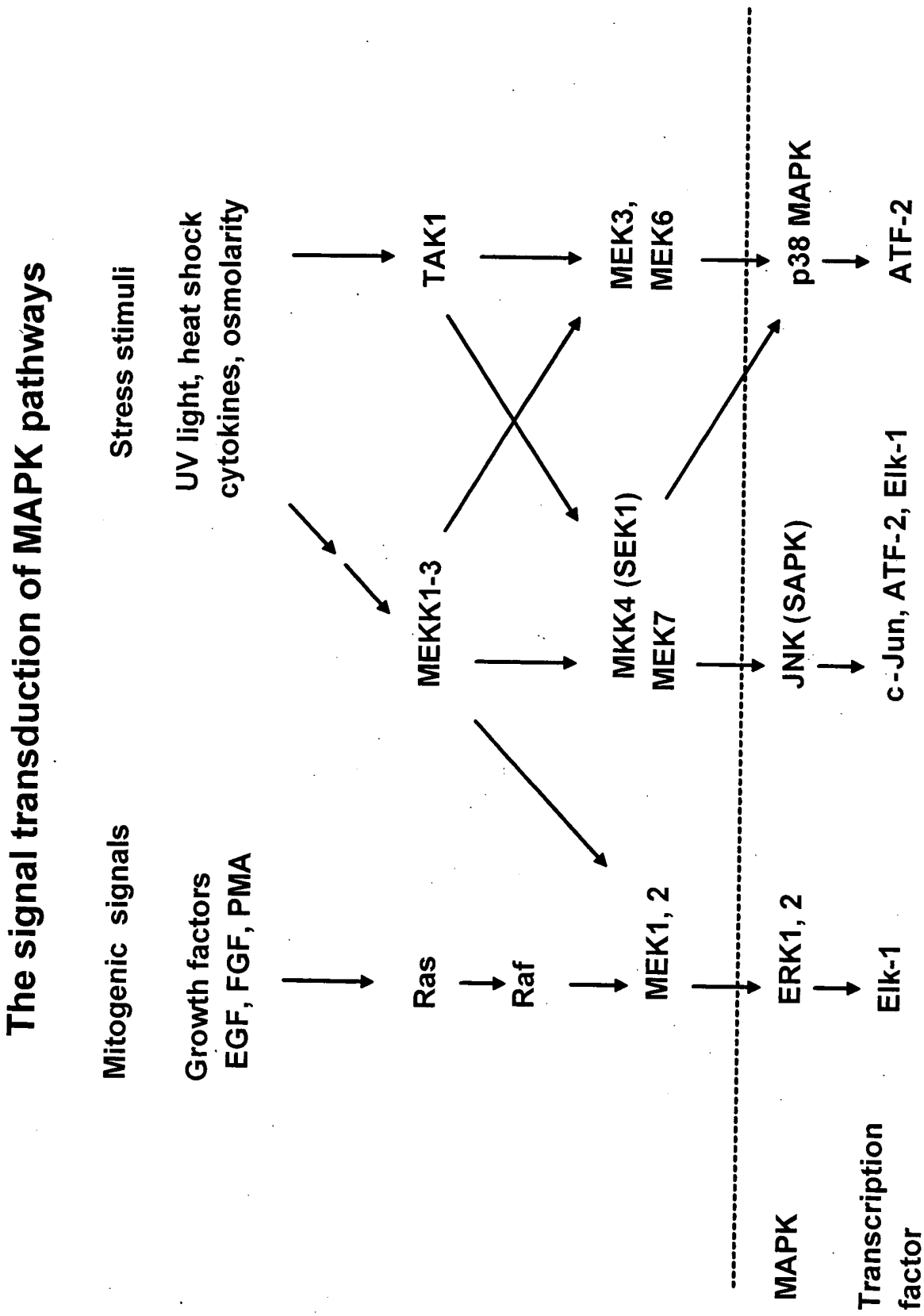

The signal transduction of MAPK pathways
Mitogenic signals
Stress stimuli
Growth factors
EGF, FGF, PMA
UV light, heat shock
cytokines, osmolarity
Ras
Raf
MEK1, 2
ERK1, 2
Elk-1
MEKK1-3
TAK1
MKK4 (SEK1)
MEK7
MEK3,
MEK6
JNK (SAPK)
p38 MAPK
c-Jun, ATF-2, Elk-1
ATF-2
MAPK
Transcription
factor

FIG. 5

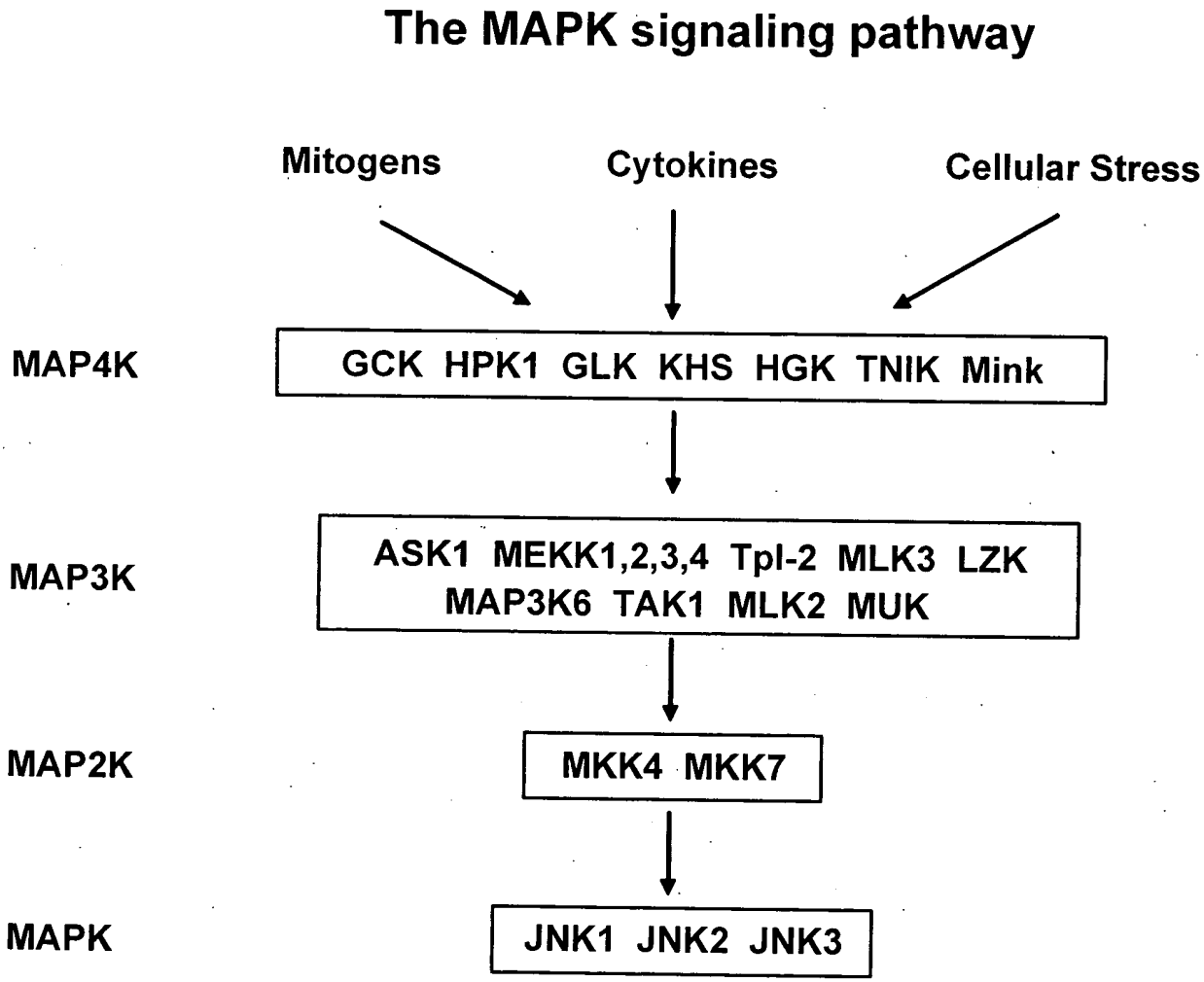

The MAPK signaling pathway
Mitogens
Cytokines
Cellular Stress
MAP4K
GCK HPK1 GLK KHS HGK TNIK Mink
MAP3K
ASK1 MEKK1,2,3,4 Tpl-2 MLK3 LZK
MAP3K6 TAK1 MLK2 MUK
MAP2K
MKK4 MKK7
MAPK
JNK1 JNK2 JNK3

FIG. 6

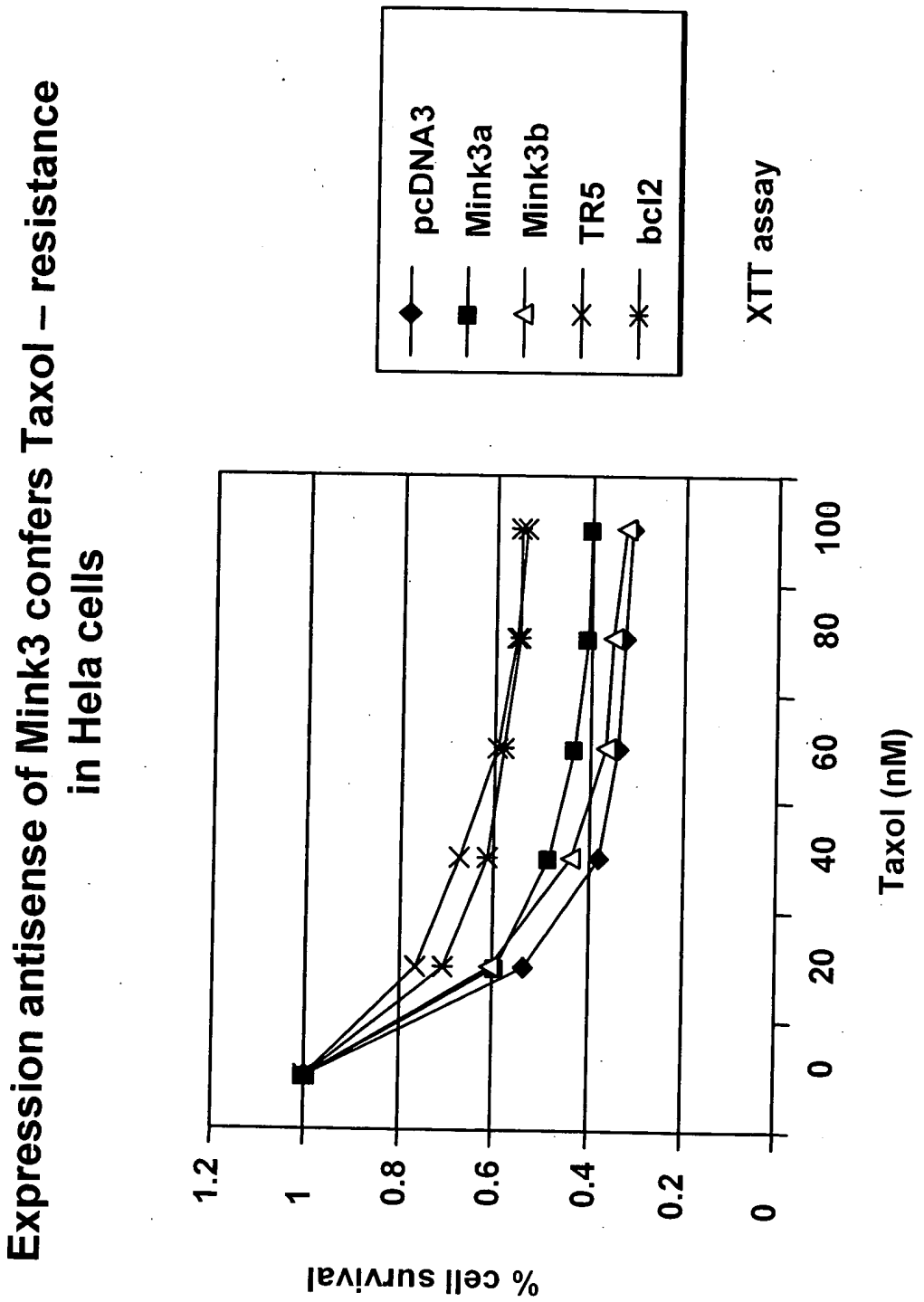

Expression antisense of Mink3 confers Taxol – resistance in Hela cells
pcDNA3
Mink3a
Mink3b
TR5
bcl2
XTT assay
% cell survival
1.2
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
Taxol (nM)

FIG. 7

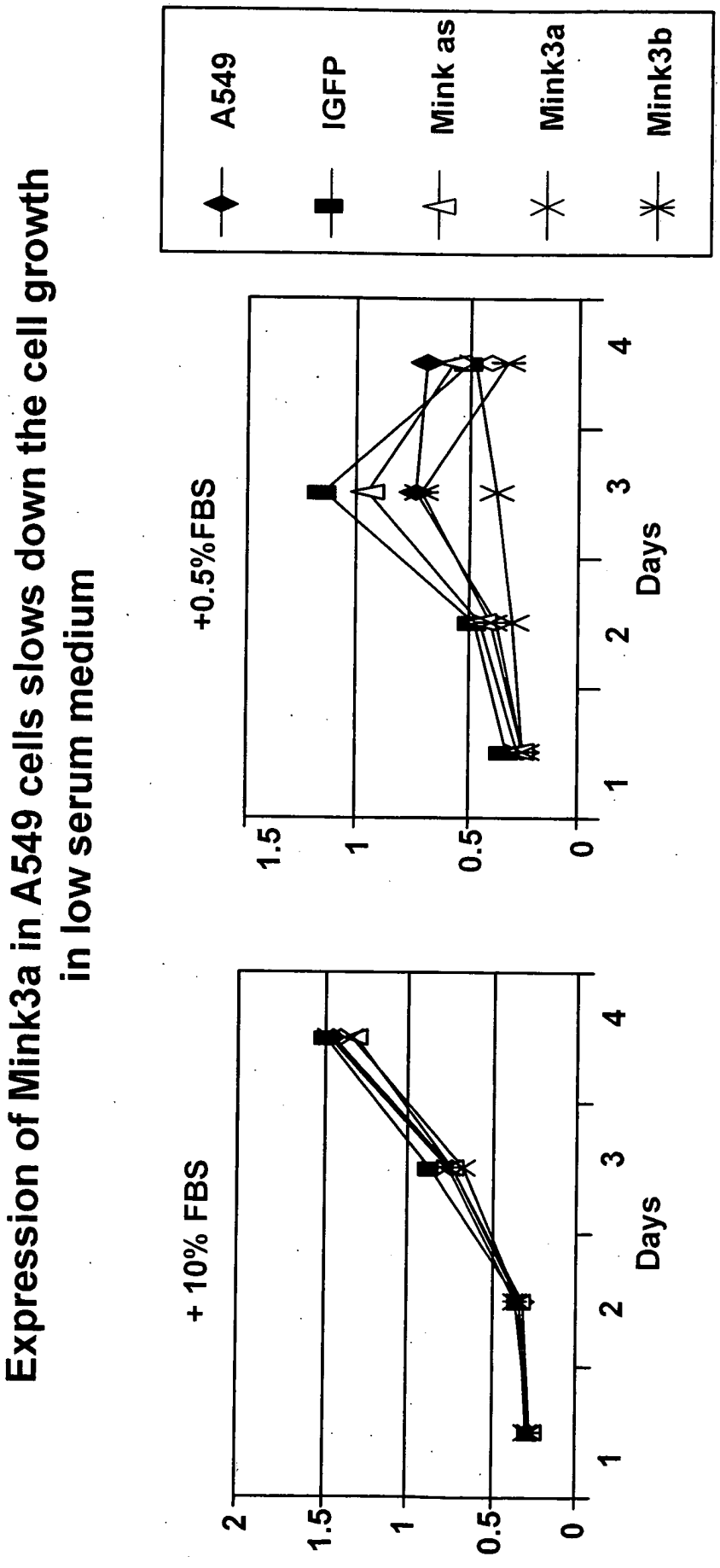

Expression of Mink3a in A549 cells slows down the cell growth in low serum medium
A549
IGFP
Mink as
Mink3a
Mink3b
+0.5%FBS
+ 10% FBS
Days
0
0.5
1
1.5
2
3
4

FIG. 8

Expression of antisense of Mink inhibits EGF-mediated induction of ERK signal pathway

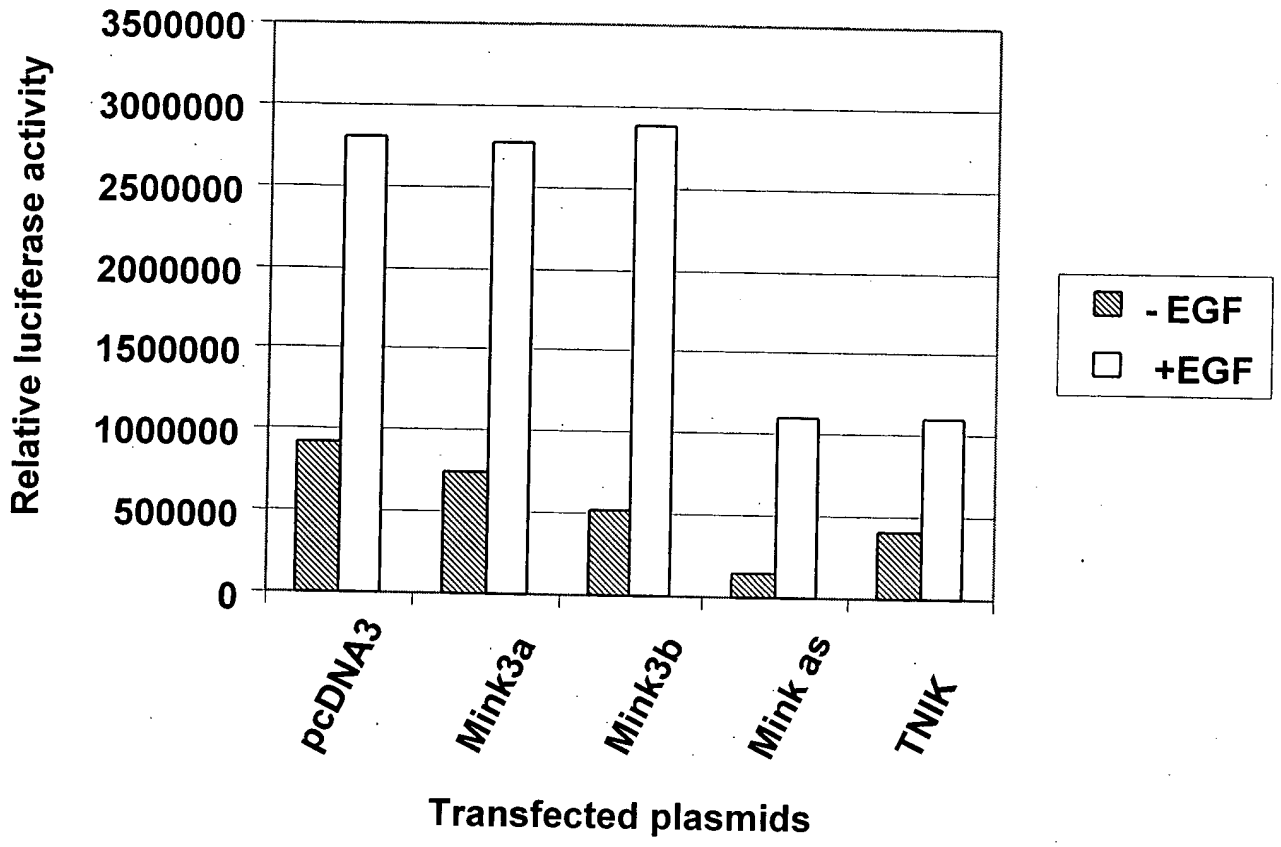


FIG. 9

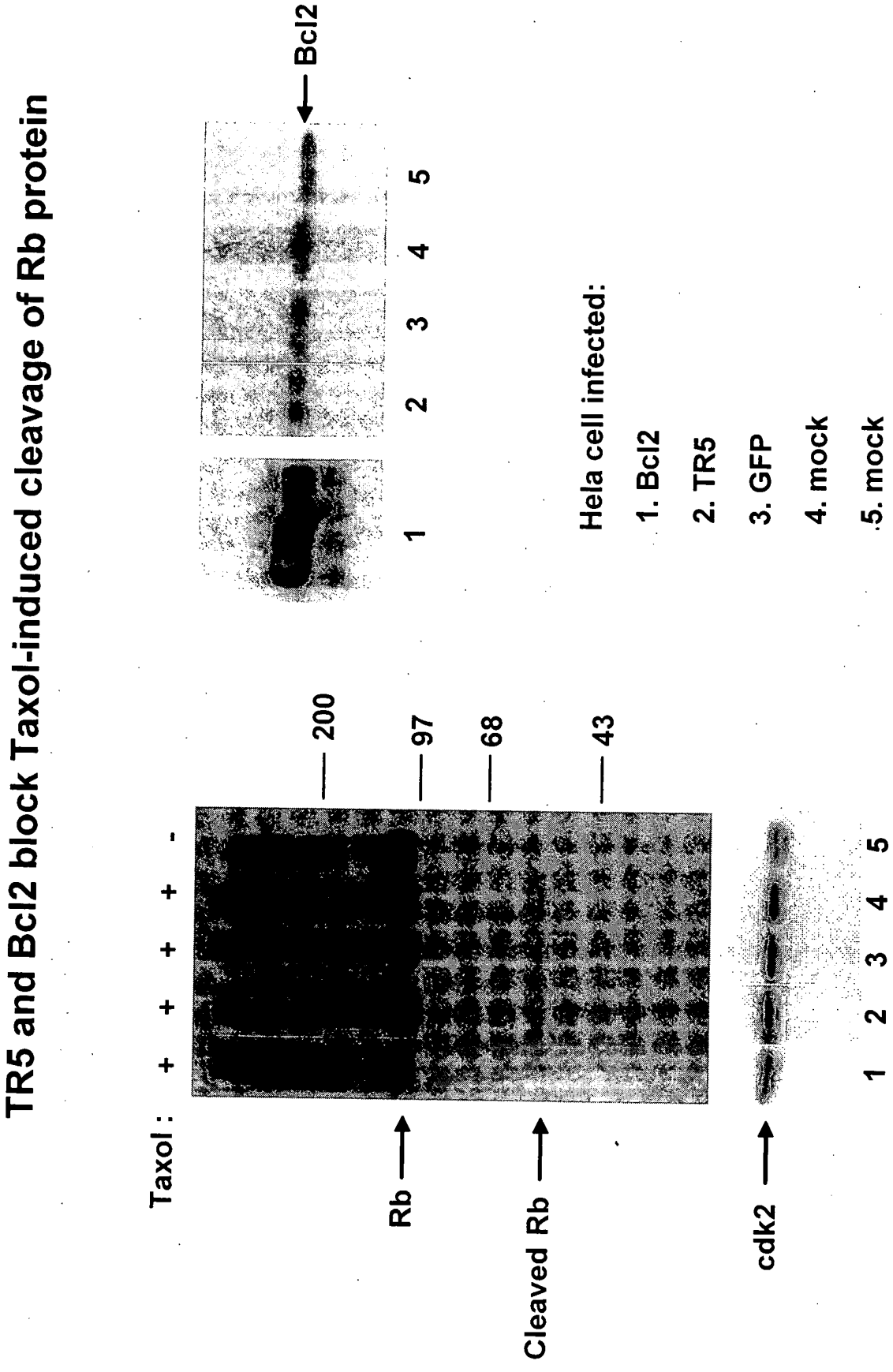

TR5 and Bcl2 block Taxol-induced cleavage of Rb protein
Bcl2
1 2 3 4 5
Hela cell infected:
1. Bcl2
2. TR5
3. GFP
4. mock
5. mock
200
97
68
43
Taxol : + + + + -
Rb
Cleaved Rb
cdk2
1 2 3 4 5

FIG. 10

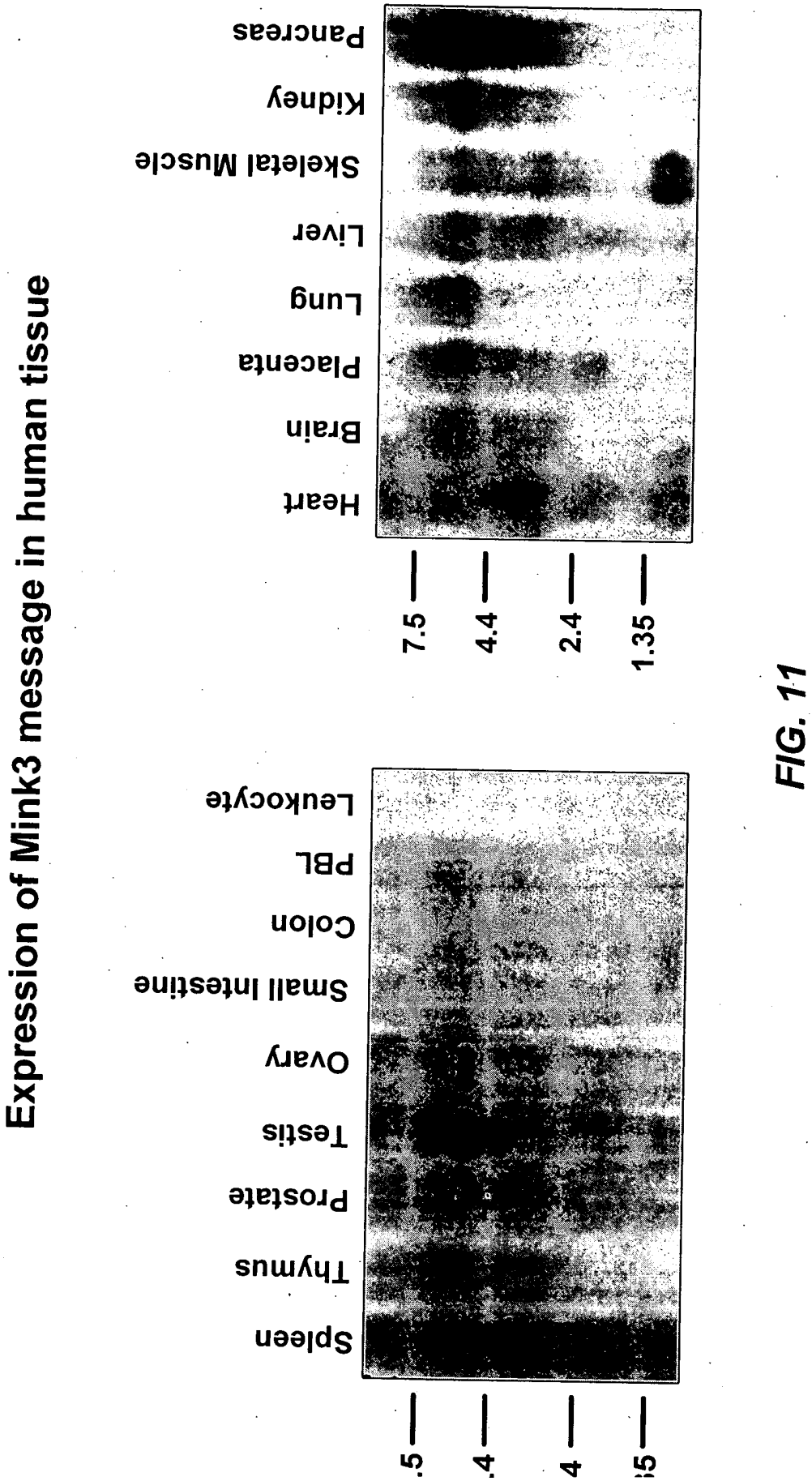

Expression of Mink3 message in human tissue
Pancreas
Kidney
Skeletal Muscle
Liver
Lung
Placenta
Brain
Heart
7.5
4.4
2.4
1.35
Leukocyte
PBL
Colon
Small Intestine
Ovary
Testis
Prostate
Thymus
Spleen

FIG. 11

Expression of Mink3 message in tumor cell lines

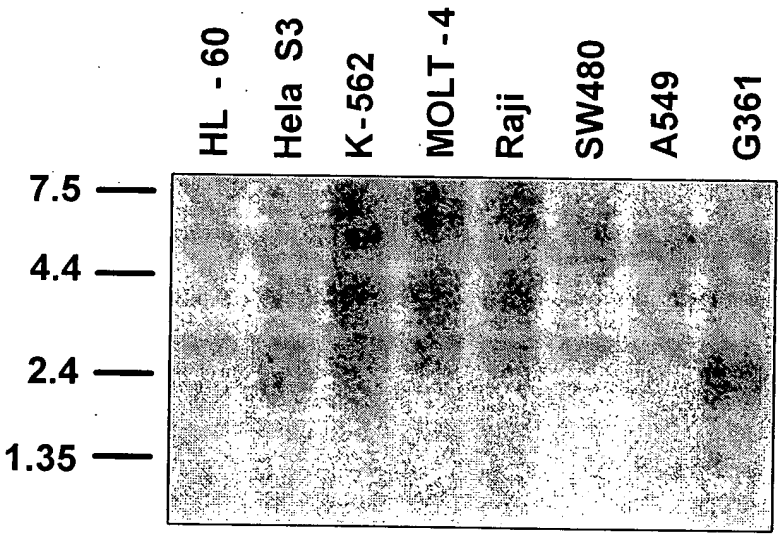


FIG. 12

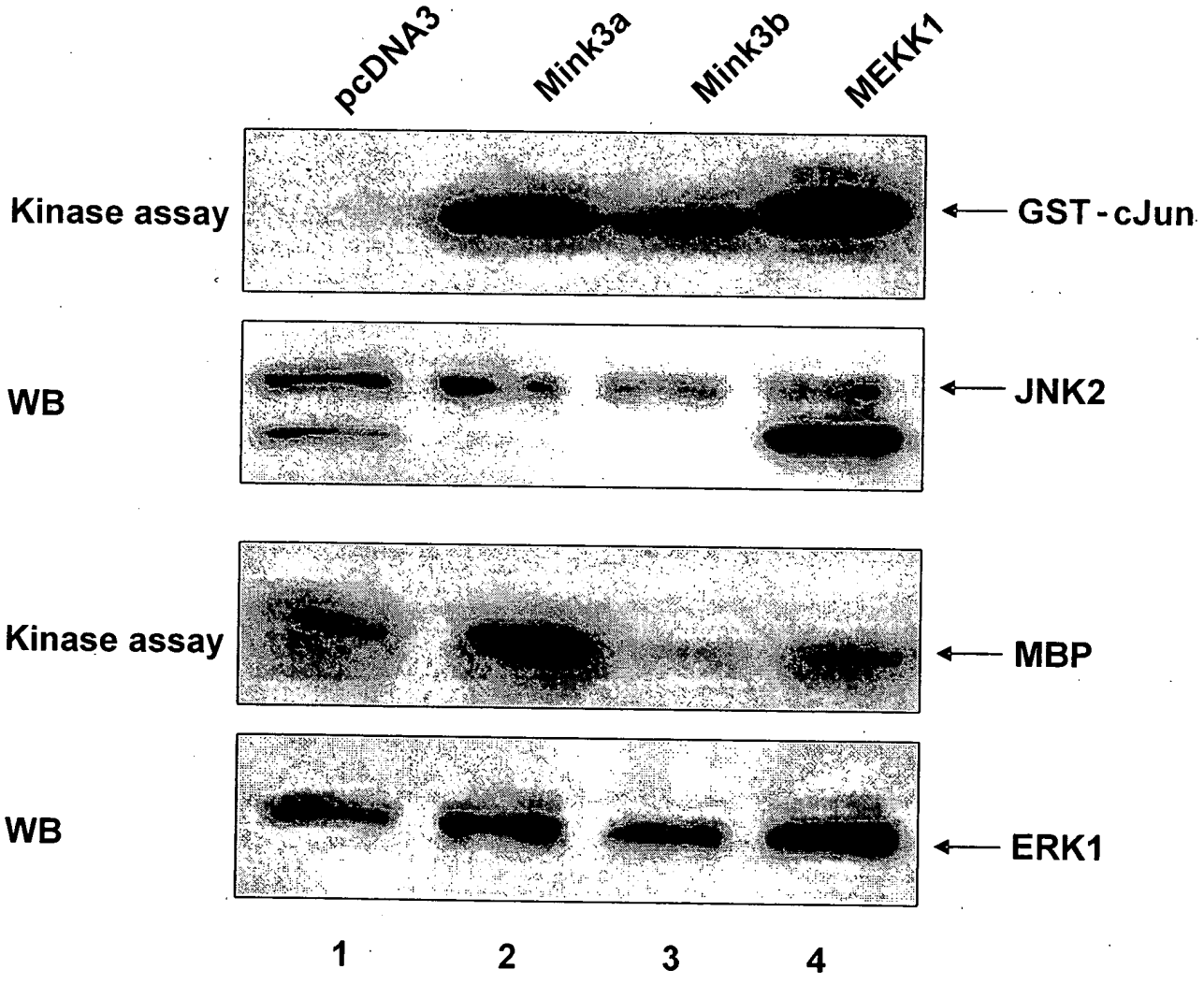

Mink3a activates JNK and ERK pathways
pcDNA3
Mink3a
Mink3b
MEKK1
Kinase assay
GST-cJun
WB
JNK2
Kinase assay
MBP
WB
ERK1
1
2
3
4

FIG. 13

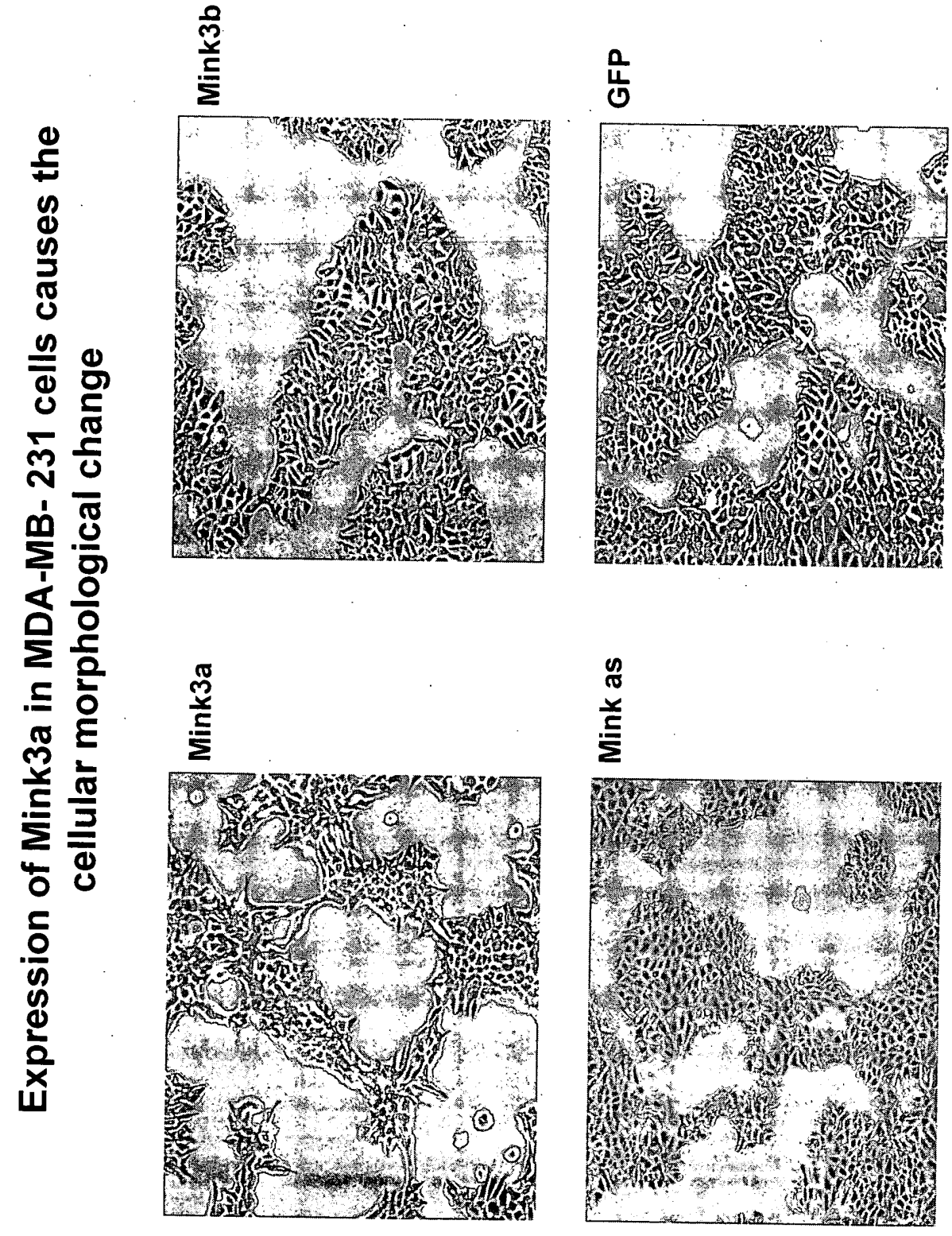
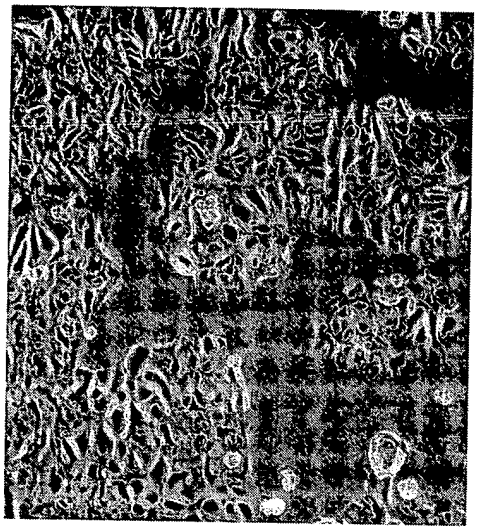

Expression of Mink3a in MDA-MB- 231 cells causes the cellular morphological change
Mink3b
GFP
Mink3a
Mink as

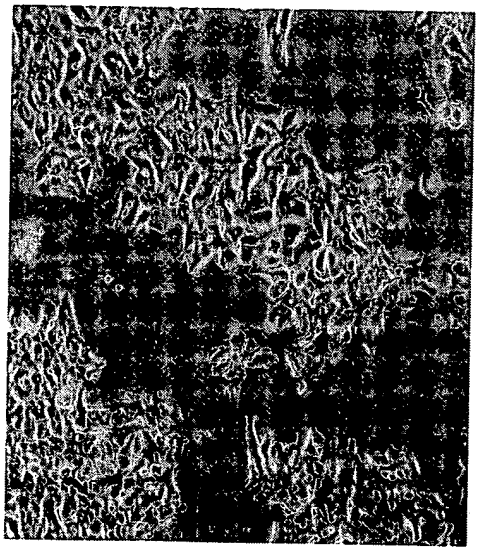
FIG. 14

MEK inhibitor restore the morphology of Mink3a infected MDA-MB-231 cells

Mink3a +PD98059



Mink3a



MDA-MB-231

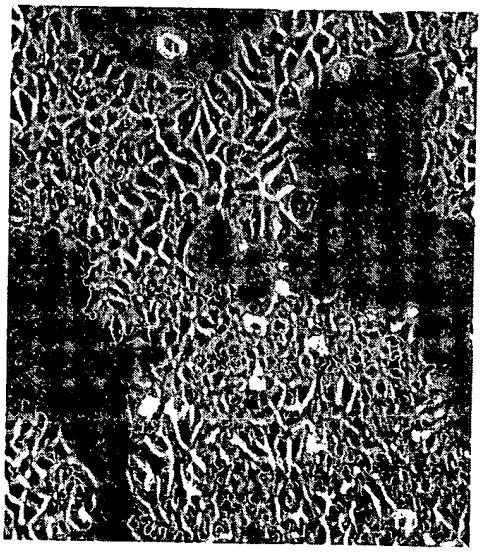


FIG. 15